**Little Heath Sixth Form**

**Mathematics (Further Pure 1)**

Personal Learning Checklist

**Student Name: ……………………….…………………………………..………**

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| **Unit Name:**  **Mathematics (Further Pure 1)** | **Unit Code:**  **MFP1** |
| *Minimum Target Grade:* | *Aspirational Target Grade:* |

*KEY:* ***Red =*** *with difficulty* ***Amber*** *= not sure* ***Green*** *= yes*

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| **GCSE, C1 and C2 Re-Cap (Skills and Knowledge)** | **Red** | **Amber** | **Green** |
| * Solve quadratic equations inc use of the quadratic formula |  |  |  |
| * Knowledge and familiarity with the Sigma notation for series |  |  |  |
| * Have knowledge of the transformations used in C1/2   i.e. the translations f(x+a), f(x-a), f(x)+a and f(x)-a, the stretches kf(x) and f(kx), and the reflections –f(x) and f(-x) |  |  |  |
| * Find the gradient and intercept from the graph of a straight line and use them to write the equation of a straight line in the form y = mx + c |  |  |  |

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| **Skills/Knowledge/Specification** |  |  |  |  |
| **ALGEBRA AND GRAPHS** | **Red** | **Amber** | **Green** | **To address this before the exam I will:-** |
| * Sketch graphs of rational functions of the form:   or or |  |  |  |  |
| * Find horizontal and vertical asymptotes |  |  |  |  |
| * Find points of intersection with the co-ordinate axes or other straight lines |  |  |  |  |
| * Solve inequalities |  |  |  |  |
| * Find the restricted regions/maximum and minimum points of the graph not using calculus |  |  |  |  |
| * Sketch the graph of a parabola of the form y = 4ax |  |  |  |  |
| * Sketch the graph of an ellipse of the form |  |  |  |  |
| * Sketch the graph of a hyperbola of the form: |  |  |  |  |
| * Sketch the graph of a rectangular hyperbola of the form: xy = c2 |  |  |  |  |
| * Use the discriminant and interpret the geometrical implications of equal roots, distinct roots, or no real roots |  |  |  |  |
| * Have knowledge of the effect a single transformations on these graphs involving translations, stretches parallel to the x or y axes, and reflections in y = x |  |  |  |  |

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| **ROOTS AND COEFFICIENTS OF A QUADRATIC EQUATION** | **Red** | **Amber** | **Green** | **To address this before the exam I will:-** |
| * Know that for an equation of the form ax2 + bx + c = 0, the sum of the roots,   and the product of the roots, |  |  |  |  |
| * Manipulate expressions involving and eg or |  |  |  |  |
| * Form new equations with roots:   , or or etc |  |  |  |  |
| * Write down the new equation using:   x2 – (sum of new roots)x + (product of new roots) = 0 |  |  |  |  |
| **COMPLEX NUMBERS** | **Red** | **Amber** | **Green** | **To address this before the exam I will:-** |
| * Know z = x + iy to represent a complex number |  |  |  |  |
| * Add or subtract complex numbers |  |  |  |  |
| * Multiply complex numbers |  |  |  |  |
| * Finding the complex conjugate of a complex number ie = x - iy |  |  |  |  |
| * Find a quadratic equation with given complex roots |  |  |  |  |
| * Find the complex roots of a quadratic equation either by using the formula or by completing the square |  |  |  |  |
| * Equate the real and imaginary parts of a complex number |  |  |  |  |
| * Solve equations of the form 2z + = 1 + i |  |  |  |  |
| **NUMERICAL METHODS** | **Red** | **Amber** | **Green** | **To address this before the exam I will:-** |
| * Proving a root exists between two points |  |  |  |  |
| * Use interval bisection to find roots to a given degree of accuracy |  |  |  |  |
| * Use linear interpolation to find roots to a given degree of accuracy using |  |  |  |  |
| * Use the Newton-Rhapson method to find the roots of an equation   i.e. to solve f(x) = 0, xn+1 = xn -- |  |  |  |  |
| * Use Euler’s Step by Step formula to find the solution of a differential equation of the from:   using yn+1 = yn + hf(xn), where xn+1 = xn + h |  |  |  |  |
| **REDUCTION TO A LINEAR LAW** | **Red** | **Amber** | **Green** | **To address this before the exam I will:-** |
| * Reduce a relation to a linear form: **Y** = m**X** + c |  |  |  |  |
| * Make estimates for m and c from graphs |  |  |  |  |
| * Plot x2 against y to achieve a linear graph y = ax2 + b, where m = a, **X** = x2 and c = b |  |  |  |  |
| * Plot against to achieve a linear graph where m = -1 and c = a |  |  |  |  |
| * Plot x against to achieve a linear graph y = ax2 + bx where m = a and c = b |  |  |  |  |
| * Use logs to reduce equations of the form:   y = axn to a linear law  i.e. log y = log a + n log x where log x is plotted against log y, m = n and c = log a |  |  |  |  |
| * Use logs to reduce equations of the form y = abx   to a linear law i.e. log y = log a + x log b where x is plotted against log y, m = log b and c = log a |  |  |  |  |
| **TRIGONOMETRY** | **Red** | **Amber** | **Green** | **To address this before the exam I will:-** |
| * Know and use the general solutions to trigonometrical equations in radian or degree form |  |  |  |  |
| * Know and use the general solution of:   sin x = k is x = n+ (-1)n or x = 180on + (-1)n  e.g. solve sin 2x = and sin 2x = 0.3 |  |  |  |  |
| * Know and use the general solution of:   cos x = k is x = 2n or x = 360o  e.g. cos ( x + ) and cos ( 3x – 1 ) |  |  |  |  |
| * Know and use the general solution of:   tan x = k is x = n or x = 180on +  e.g. tan ( - 2x ) |  |  |  |  |
| * Know and use the exact values for the sine, cosine and tangent of (or 30o, 45o and 60o) and multiples of them |  |  |  |  |
| **MATRIX ALGEBRA** | **Red** | **Amber** | **Green** | **To address this before the exam I will:-** |
| * Add or subtract matrices i.e. 2 x 2 and 2 x 1 |  |  |  |  |
| * Multiply a matrix by a scalar |  |  |  |  |
| * Multiply two matrices together |  |  |  |  |
| * Identify the identity matrix I for a 2 x 2 matrix |  |  |  |  |
| * Find where a point is transformed to given a linear transformation in matrix form |  |  |  |  |
| * To prove if a transformation is linear |  |  |  |  |
| * Describe a rotation, reflection or enlargement as a 2x2 matrix |  |  |  |  |
| * Find the matrix of a given rotation, reflection or enlargement |  |  |  |  |
| * Find transformations of points in the x – y plane represented by a 2 x 2 matrix   i.e. rotations, stretches parallel to x- and y- axis and enlargements with centre the origin |  |  |  |  |
| * Use the standard transformation matrices given in the formula booklet   i.e. anticlockwise rotation through about O is given by  and a reflection in the line y = (tan)x is given by |  |  |  |  |
| * Use combinations of these transformations |  |  |  |  |
| **SERIES** | **Red** | **Amber** | **Green** | **To address this before the exam I will:-** |
| * Use Sigma notation for writing the sum of a series |  |  |  |  |
| * Finding the sum of the natural numbers (integers) using the formula |  |  |  |  |

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| * Using the given formulae for the sum of series for x squared and x cubed   i.e. and |  |  |  |  |
| * Find the sum of a cubic or quadratic series using the formulae |  |  |  |  |
| * To show the sum of the first n terms of a series can be written in a given form |  |  |  |  |
| **CALCULUS** | **Red** | **Amber** | **Green** | **To address this before the exam I will:-** |
| * Find the gradient of the tangent to the curve at a point, i.e. |  |  |  |  |
| * Evaluate improper integrals with limits involving infinity   i.e. eg |  |  |  |  |
| * Evaluate an improper integral which is undefined at one of the limits   i.e. if f(x) is not defined at x = p then  , provided the limit exists  e.g. |  |  |  |  |

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| **REVISION**  **Use the information on this checklist to make revision cards and notes** |

**Grade tracking:**

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*Note: You should discuss this checklist regularly with your subject teacher/mentor*